

## BEST AVAILABLE COPY

(19)日本国特許庁 (JP)

(12) 公開実用新案公報 (U)

(11)実用新案出願公開番号

実開平7-20769

(43)公開日 平成7年(1995)4月11日

(51)Int.Cl<sup>8</sup>  
H04N 5/64識別記号 庁内整理番号  
511 A 7205-5C

P I

技術表示箇所

審査請求 未請求 請求項の数2 OL (全4頁)

(21)出願番号

実開平5-52470

(22)出願日

平成5年(1993)9月28日

(71)出願人 000000376

オリンパス光学工業株式会社

東京都渋谷区幡ヶ谷2丁目43番2号

(72)考案者 德岡 有紀

東京都渋谷区幡ヶ谷2丁目43番2号 オリ

ンパス光学工業株式会社内

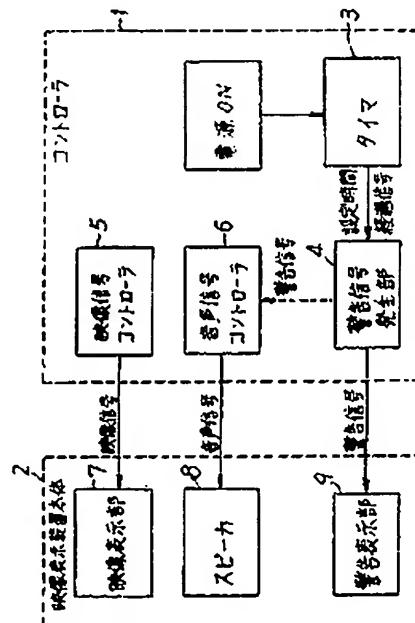
(74)代理人 弁理士 杉村 晓秀 (外5名)

(54)【考案の名称】 映像表示装置

(57)【要約】

【目的】 映像表示装置を装着して映像観察を行う際の、長時間継続使用時の疲労対策のために警告表示を行うようにした映像表示装置を提供する。

【構成】 コントローラ1から観察者が装着した映像表示装置本体2に映像を導いて観察者の眼球に表示する。コントローラ1は、映像表示に伴う基準時刻からの経過時間を計測するタイマ3と、タイマ3からの設定時間経過信号に基づいて警告信号を発生する警告信号発生部4と、映像の中から映像信号および音声信号を交互取り出して出力する映像信号コントローラ5および音声信号コントローラ6とを具える。映像表示装置本体2は、入力された映像信号を観察者の眼球に表示する映像表示部7と、入力された音声信号を観察者の耳に伝達するスピーカ8と、入力された警告信号に基づき所定の警告シンボルマーク、警告メッセージ等を映像として警告表示する警告表示部9とを具える。



(2)

平成平7-20769

1

## 【実用新案登録請求の範囲】

【請求項 1】 映像を観察者の眼眸に表示する映像表示装置において、映像表示に関する基準時刻からの経過時間を計測する経過時間計測手段と、該経過時間計測手段により計測した経過時間に基づいて警告信号を発生する警告信号発生手段と、該警告信号発生手段が発生した警告信号に基づいて警告表示を行う警告表示手段とを具えて成ることを特徴とする、映像表示装置。

【請求項 2】 予め警告信号を発生する時刻を設定する警告信号発生時刻設定手段を設け、当該設定時刻に警告信号を発生するようにしたことを特徴とする、請求項 1記載の映像表示装置。

## 【図面の簡単な説明】

【図 1】 本考案の映像表示装置の第 1 実施例の構成を示すブロック図である。

【図 2】 第 1 実施例における警告表示の表示方法を説明するための図である。

【図 3】 第 1 実施例の警告表示部の構成例を示す図である。

【図 4】 第 1 実施例の警告表示部の構成例を示す図である。

\* 【図 5】 第 1 実施例の警告表示部の構成例を示す図である。

【図 6】 図 5 の構成における警告表示の表示方法を説明するための図である。

【図 7】 本考案の映像表示装置の第 2 実施例の構成を示すブロック図である。

【図 8】 本考案の映像表示装置の第 3 実施例の構成を示すブロック図である。

【図 9】 (a)、(b) は夫々、警笛センサ 30 の構成例を示す図である。

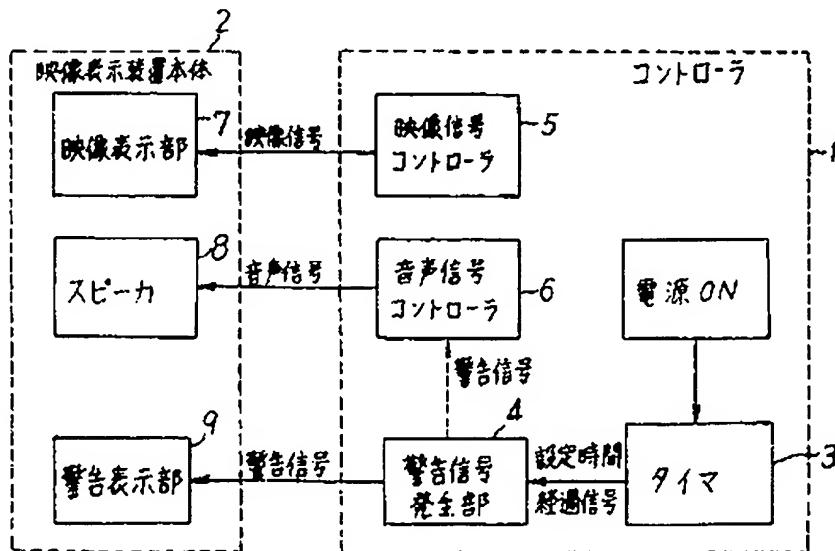
【図 10】 本考案の映像表示装置の第 4 実施例の構成を示すブロック図である。

## 【符号の説明】

- 1 コントローラ
- 2 映像表示装置本体
- 3 タイマ（経過時間計測手段）
- 4 警告信号発生部（警告信号発生手段）
- 5 映像信号コントローラ
- 6 音声信号コントローラ
- 7 映像表示部
- 8 スピーカ
- 9 警告表示部

\*

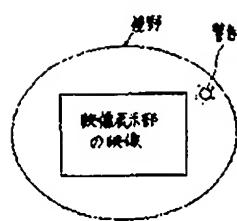
【図 1】



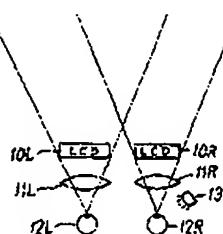
実開平7-20769

(3)

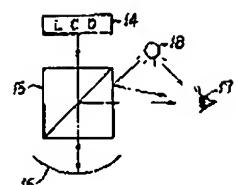
[図2]



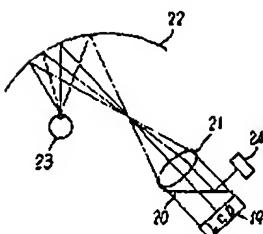
[図3]



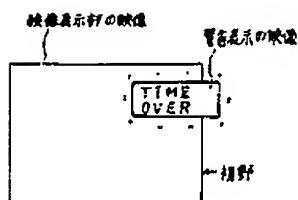
[図4]



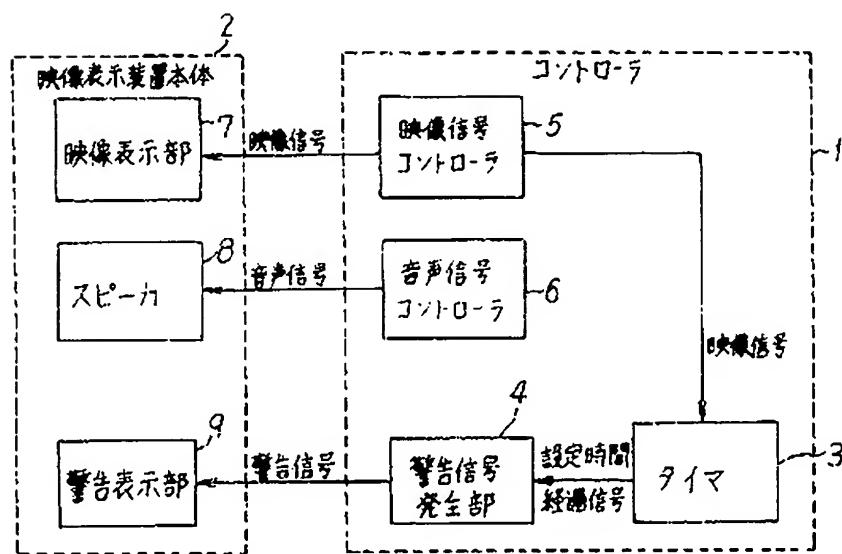
[図5]



[図6]



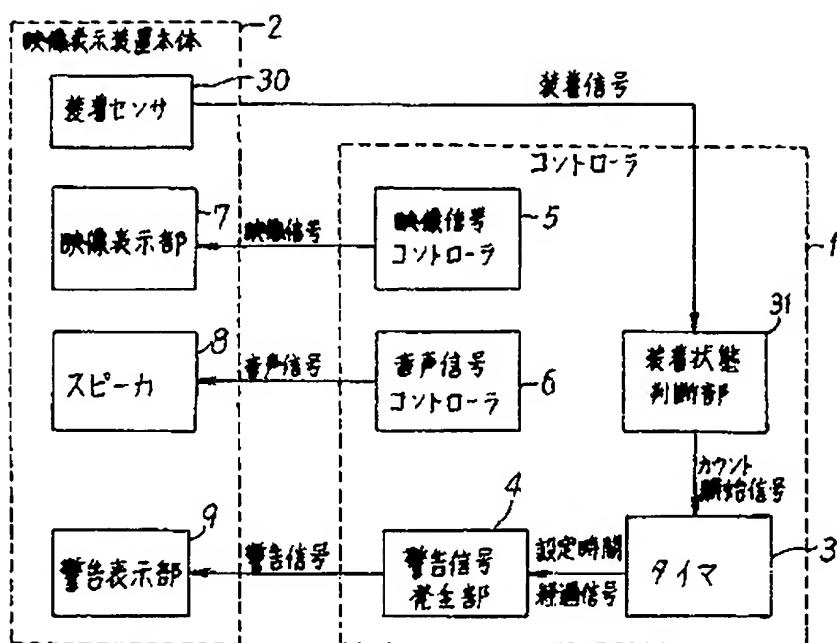
[図7]



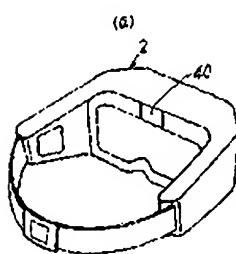
(4)

特開平7-20769

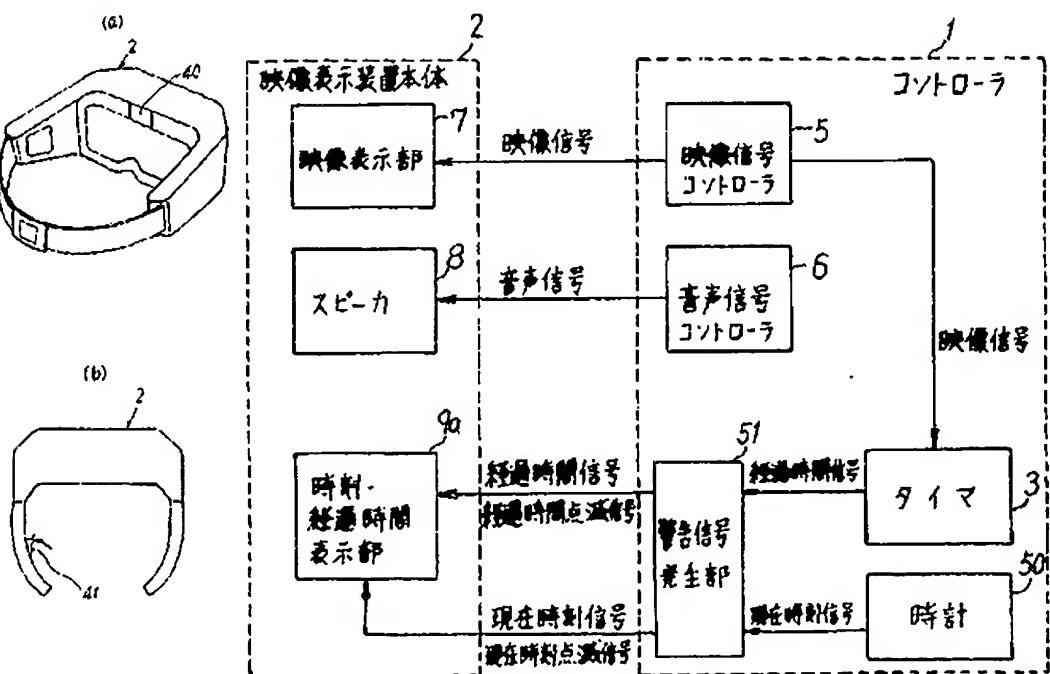
[図8]



[図9]



[図10]



**【考案の詳細な説明】****【0001】****【産業上の利用分野】**

本考案は、観察者の眼球に映像を導いて映像表示を行う映像表示装置であって、観察者の疲労対策を盛り込んだ映像表示装置に関するものである。

**【0002】****【従来の技術】**

映像表示装置の従来例としては、例えば特開昭59-117876号公報や特開平3-188777号公報に開示されたものがある。上記特開平3-188777号公報記載の従来例は、頭部や顔面等に装着して映像表示素子に表示された映像を光学系等を介して観察者の眼球に導くことにより、前記映像を眼球に拡大投影することができる。この映像の拡大投影により、観察者は、40インチテレビジョン画面上に表示した映像と同等以上の大画面映像を得ることができ、しかも、画面の周辺部を暗くすることができるので高度の臨場感を得ることができる。

**【0003】****【考案が解決しようとする課題】**

上記従来例においては、上述したように高度の臨場感が得られるという利点がある反面、映像表示装置による映像観察に没頭する余り、眼球や視神経等の頭部の疲労に気付かず、眼球や視神経等に過剰な負荷を掛けてしまうことがある。その場合、後で気分が悪くなったり、眼球疲労を起こして観察者の健康に悪影響を与える惧れがある。また、映像表示装置を装着したまま居眠りした場合、首、耳、後頭部等に痛みを感じる惧れがある。

**【0004】**

本考案は、このような問題点に鑑みてなされたものであり、映像表示装置を装着して映像観察を行う際の、特に長時間継続使用時の疲労対策のために警告表示を行うようにした、映像表示装置を提供することを目的とする。

**【0005】****【課題を解決するための手段】**

この目的のため、本考案の請求項1の構成は、映像を観察者の眼球に表示する

(6)

実開平7-20769

映像表示装置において、映像表示に関する基準時刻からの経過時間を計測する経過時間計測手段と、該経過時間計測手段により計測した経過時間に基づいて警告信号を発生する警告信号発生手段と、該警告信号発生手段が発生した警告信号に基づいて警告表示を行う警告表示手段とを具えて成ることを特徴とする。

また、本考案の請求項2の構成は、請求項1の構成において、予め警告信号を発生する時刻を設定する警告信号発生時刻設定手段を設け、当該設定時刻に警告信号を発生するようにしたことを特徴とするものである。

#### 【0006】

##### 【作用】

本考案の請求項1の構成によれば、映像表示装置が映像表示部から観察者の眼球に映像を表示する際には、経過時間計測手段が映像表示に関する基準時刻からの経過時間を計測し、警告信号発生手段が前記経過時間計測手段により計測した経過時間に基づいて警告信号を発生し、警告表示手段が前記警告信号発生手段により発生された警告信号に基づいて警告表示を行うから、観察者が長時間に亘って映像表示装置を継続使用すると、前記基準時刻からの経過時間が所定時間を超過した時点で警告表示がなされることになり、観察者の眼球や視神経等の疲労の発生が防止される。

#### 【0007】

また、本考案の請求項2の構成によれば、上記警告表示に加えて、警告信号発生時刻設定手段により予め設定した時に発生される警告信号によってもう1つの警告表示がなされるから、二重の警告表示システムとなって疲労発生防止効果がさらに大きくなる。

#### 【0008】

##### 【実施例】

以下、本考案の実施例を図面に基づき詳細に説明する。図1は本考案の映像表示装置の第1実施例の構成を示すブロック図であり、図中1はコントローラを示し、2は映像表示装置本体（以下、本体）を示す。

コントローラ1は、電源ONによりカウントを開始するタイマ3と、タイマ3のカウント値が予め設定した時間に対応する値になったときタイマ3が発生する

(7)

実開平7-20769

設定時間経過信号を受けて警告信号（アラーム信号）を発生する警告信号発生部4と、図示しない映像供給装置（テレビジョン放送の電波であったり、ビデオテープ等の映像記録媒体を再生するビデオデッキ等であったりする）から読み込んだ映像の中から映像信号を取り出して出力する映像信号コントローラ5と、前記映像の中から音声信号を取り出して出力する音声信号コントローラ6とを具えて成る。

#### 【0009】

本体2は、映像信号コントローラ5から映像信号を入力されて観察者の眼球に映像を拡大投影して表示する映像表示部7と、音声信号コントローラ6から音声信号を入力されて観察者の耳に音声を伝達するスピーカ8と、警告信号発生部4から警告信号を入力されて所定の警告シンボルマーク、警告メッセージ等を映像として警告表示する警告表示部9とを具えて成る。本例では、上記警告表示は、例えば図2に示すように、観察者が映像表示装置を装着したときの視野の、映像表示部に表示された映像の観察に支障しない位置（例えば視野の周辺部）に点灯表示または点滅表示するものとするが、観察すべき映像に重畳して表示してもよい。

なお、図1に点線で示すように、警告信号発生部4から音声信号コントローラ6にも警告信号を出力し、警告メッセージを表わす音声信号を映像自体の音声信号に重畳するようにしてもよい。

#### 【0010】

図3～図5は夫々、警告表示部9の構成例を示す図である。図3は、映像表示素子（LCD）10L, 10Rから映像を接眼光学系11L, 11Rを介して観察者の眼球12L, 12Rに導く光路の、接眼光学系11Rの近傍に警告ランプ(LED)13を設けている。図4は、LCD14からの映像をビームスプリッタ15および凹面ミラー16を介して観察者の眼球17に導く光路の、LCD14の近傍に警告ランプ(LED)18を設けている。図5は、LCD19から映像をビームスプリッタ20、接眼光学系21および凹面ミラー22を介して観察者の眼球23に導く光路の、ビームスプリッタ20の近傍に警告ランプ(LED)24を設けている。

## 【0011】

上記図3および図4の構成によれば、警告表示自体にはピント合わせを行う必要がないので光学系や映像表示素子の近傍に配置することができ、それにより、警告ランプが点灯または点滅する際には、図3では観察者の視野の周辺部に警告表示がほんやりと見え、図4では警告ランプ18からの光がビームスプリッタ15で反射されて視野の一部または全体の明るさや色が変化するので、警告表示を認識することができる。また、図5の構成によれば、図6に示すように警告表示の映像を映像表示部の映像に重畠して表示することができる。その場合、警告表示にピントを合わせることが容易なので、図6のように警告メッセージを文字で表示して観察者に注意を促すことができる。

## 【0012】

この第1実施例は、コントローラ1の電源ONの時点を基準時刻とし、その時点から予め設定した時間が経過した時点で、映像による警告表示がなされるので、時間の経過を忘れて観察に没頭してしまうことが回避され、過度の疲労を防止することができる。さらに、上記音声による警告表示を追加した構成の場合には、映像表示装置を装着したまま居眠りした場合であっても、音声による警告メッセージがなされるので、長時間映像表示装置を装着したままの姿勢で居続けると首、耳、後頭部等に痛みを感じる不具合が生じることはない。

## 【0013】

図7は本考案の映像表示装置の第2実施例の構成を示すブロック図であり、図1の第1実施例と同一の部分には同一符号を付けて説明を省略する。

この第2実施例の第1実施例との相違点は、映像信号コントローラ5からタイマ3に映像信号を映像開始信号として入力するように構成して、映像信号の入力が開始された時点を基準時刻としてその時点からタイマ3がカウントを開始するよう変更したことである。この変更は、観察者がコントローラ1の電源をONにした状態であっても、必ずしも観察者が本体2を装着しているとは限らないことを考慮したものである。

## 【0014】

この第2実施例は、上記第1実施例の作用効果が得られる上に、カウント値が

予め設定した時間に対応する値になったときタイマ3が発生する設定時間経過信号が、観察者が実際に映像表示装置を装着して映像を観察し始めてからの経過時間と対応するので、コントローラ1の電源をONにした後に映像表示装置を装着しないままにしている場合や、映像表示装置を装着した後に取り外して映像観察を中断したため実際の装着時間がタイマ3のカウント値よりも短くなった場合に、正確に実際の装着時間に基づくタイミングで警報表示を行う効果が得られる。

#### 【0015】

図8は本考案の映像表示装置の第3実施例の構成を示すブロック図であり、図1の第1実施例と同一の部分には同一符号を付けて説明を省略する。

この第3実施例の第1実施例との相違点は、映像表示装置本体2が観察者の頭部または頸面部に装着されたとき装着信号を発する装着センサ30を本体2に設けたことと、装着センサ30から入力される装着信号に基づいてカウント開始信号をタイマ3に出力する装着状態判断部31を設けたことである。

#### 【0016】

図9(a)、(b)は夫々、装着センサ30の構成例を示す図である。図9(a)では、映像表示装置の本体2を装着したときに観察者の額と接触する部分にタッチセンサ40を設け、額とタッチセンサ40との接触や額から受ける軽い圧力でタッチスイッチ40がON/OFF動作を行って装着信号を出力するようにしている。また、図9(b)では、映像表示装置の本体2を装着したときに観察者の側頭部が当接する部分の近傍にばね部材より成るスイッチ41を設け、映像表示装置を所定の装着状態にしたときスイッチ41が押し込まれてONするようにしている。

#### 【0017】

この装着状態判断部31は、装着センサ30からの装着信号の入力の有無を絶えず監視しており、装着信号の入力があった場合には観察者が映像表示装置を装着していると判断してカウント開始信号をタイマ3に出力することによりタイマ3のカウント値をインクリメントし、それにより装着時を基準時刻としてその時点からの経過時間がカウントされる。一方、装着センサ30からの装着信号の入力がなくなると装着状態判断部31からタイマ3へのカウント開始信号の入力も

(10)

平成7-20769

絶たれ、タイマ3においてその時点までのカウント値がクリアされる。したがって、タイマ3は観察者が実際に本体2を装着している連続装着時間を監視することになり、その連続装着時間が設定時間に達したとき以降に警告表示が発せられる。

#### 【0018】

なお、上記構成においては、本体2を一時的に取り外しただけでもタイマ3のカウント値がクリアされるので、連続装用時間を正確に把握できない場合がある。その対策として、例えば装着状態判断部31に入力される装着信号が一時的にOFFになった場合に、一定時間（例えば10分間）タイマ3のON状態を保持するように構成してもよい。

#### 【0019】

図10は本考案の映像表示装置の第4実施例の構成を示すブロック図であり、図1の第1実施例と同一の部分には同一符号を付けて説明を省略する。

この第4実施例は、タイマ3からの経過時間信号と、時計50からの現在時刻信号とを警告信号発生部51を介して時刻・経過時間表示部9aで受信し、経過時間並びに現在時刻を表示するようにしている。

すなわち、タイマ3と時計50からの経過時間信号および現在時刻信号は、経過時間が予め設定した時間に対応する値になるまでは警告信号発生部51をスルーして表示部9aに送られてそのまま表示され、予め設定した時間に対応する値になったとき現在時刻点滅信号や経過時間点滅信号として時刻・経過時間表示部9aに送られて点滅表示される。

#### 【0020】

この時、時刻・経過時間表示部9aに表示された現在時刻や経過時間が映像のじやまになる時は、設定時間が来るまでの間この現在時刻や経過時間の表示を消しておき、設定時間になるとともに表示し、点滅させるように警告信号発生部51を構成しても良い。

また、第1～第3実施例のタイマを時刻設定機能を有する時計に替えて、予め特定の時刻を設定しておくことにより上記警告表示等をコントロールしてやってもかまわない。

**【0021】**

さらに、上記第2実施例および第3実施例の構成を組み合わせて、映像観察を開始してから警告を発するまでの設定時間および、映像表示装置本体2を装着してから警告を発するまでの設定時間を夫々、独立かつ任意に設定し得るようにすることにより、何れか先に設定時間に到達した方の警告表示がなされるよう構成することもできる。この場合、観察者に合わせて個別に警告表示の動作条件を設定することが可能になる。

**【0022】****【考案の効果】**

以上説明したように本考案の請求項1の構成によれば、映像表示装置が映像表示部から観察者の眼球に映像を表示する際には、経過時間計測手段が映像表示に関する基準時刻からの経過時間を計測し、警告信号発生手段が前記経過時間計測手段により計測した経過時間に基づいて警告信号を発生し、警告表示手段が前記警告信号発生手段により発生された警告信号に基づいて警告表示を行うから、観察者が長時間に亘って映像表示装置を継続使用すると、前記基準時刻からの経過時間が所定時間を経過した時点で警告表示がなされることになり、観察者の眼球や視神経等の疲労の発生が防止される。

**【0023】**

また、本考案の請求項2の構成によれば、上記警告表示に加えて、警告信号発生時刻設定手段により予め設定した時刻に発生される警告信号によってもう1つの警告表示がなされるから、二重の警告表示システムとなって疲労発生防止効果がさらに大きくなる。

CLAIMS

---

[Utility model registration claim]

[Claim 1] The graphic display device equipped with the optical system which projects the image displayed on the graphic display component which displays an image, and said graphic display component at least on an observer's eyeball, The image switch means which switches the image which it is prepared in said graphic display device and one, or another object, and is led to said observer's eyeball, The first image switch means control unit with which the first signal which is formed in said graphic display device and one, or another object, and controls said image switch means was made as an output is possible, With said graphic display device, it is prepared in another object, and has the second image switch means control unit made as an output of the second signal which controls said image switch means is possible. The graphic display system characterized by the ability not to be based on said first signal but control said image switch means by said second signal compulsorily.

[Claim 2] The graphic display system according to claim 1 characterized by being an external world image switch means by which said image switch means switches induction/cutoff of the external world image led to said observer's eyeball.

[Claim 3] The graphic display system according to claim 1 characterized by being an image switch means by which said image switch means switches the image displayed on said graphic display component.

DETAILED DESCRIPTION

---

[Detailed explanation of a design]

[0001]

[Industrial Application]

This design is a graphic display device which leads an image to an observer's eyeball and performs graphic display, and is related with the graphic display device which incorporated an observer's cure against fatigue.

[0002]

[Description of the Prior Art]

As a conventional example of a graphic display device, there are some which were indicated by JP,59-117876,A and JP,3-188777,A, for example. The conventional example given

[ above-mentioned ] in JP,3-188777,A can carry out expansion projection of said image at an eyeball by leading the image which equipped a head, the face, etc. and was displayed on the graphic display

component to an observer's eyeball through optical system etc. By expansion projection of this image, an observer can acquire the image displayed on the 40 inch television screen, and the big screen image more than equivalent, and moreover, since he can make the periphery of a screen dark, he can get advanced presence.

[0003]

[Problem(s) to be Solved by the Device]

In the above-mentioned conventional example, one may not notice heads, such as an eyeball and an optic nerve fiber, fatigue, but a superfluous load may be hung on an eyeball, an optic nerve fiber, etc. just because it is devoted to the image observation by the graphic display device, while there is an advantage that advanced presence is obtained, as mentioned above. In that case, a temper worsens later or there is \*\*\*\* which causes eyeball fatigue and has a bad influence on an observer's health. Moreover, when it dozes equipped with a graphic display device, there is \*\*\*\* which senses a pain for a neck, a lug, the regio occipitalis capitis, etc.

[0004]

This design is made in view of such a trouble, and aims at offering the graphic display device which was made to perform an alarm display for the cure against fatigue at the time of long duration continuation use especially in case it equips with a graphic display device and image observation is performed.

[0005]

[Means for Solving the Problem]

In the graphic display device with which the configuration of claim 1 of this design displays an image on an observer's eyeball for this purpose, it is characterized by to have an elapsed-time measurement means measure the elapsed time from the criteria time of day about graphic display, an alarm signal generating means generate an alarm signal based on the elapsed time measured with this elapsed-time measurement means, and an alarm display means perform an alarm display based on the alarm signal which this alarm signal generating means generated, and to change.

Moreover, in the configuration of claim 1, the configuration of claim 2 of this design establishes an alarm signal generating time-of-day setting means to set up the time of day which generates an alarm signal beforehand, and is characterized by making it generate an alarm signal at the setting time of day concerned.

[0006]

[Function]

In case a graphic display device displays an image on an observer's eyeball from the graphic display section according to the configuration of claim 1 of this design An elapsed time measurement means measures the elapsed time from the criteria time of day about graphic display. An alarm signal is generated based on the elapsed time which the alarm signal generating means measured with said

elapsed time measurement means. Since an alarm display means performs an alarm display based on the alarm signal generated by said alarm signal generating means, if an observer does continuation use of the graphic display device [ long duration ] When the elapsed time from said criteria time of day goes through predetermined time, an alarm display will be made, and generating of fatigue, such as an observer's eyeball and an optic nerve fiber, is prevented.

[0007]

Moreover, according to the configuration of claim 2 of this design, since another alarm display is made by the alarm signal generated at the time of day beforehand set up with the alarm signal generating time-of-day setting means in addition to the above-mentioned alarm display, it becomes the alarm display system of a duplex and the fatigue generating prevention effectiveness becomes still larger.

[0008]

[Example]

Hereafter, the example of this design is explained to a detail based on a drawing. Drawing 1 is the block diagram showing the configuration of the 1st example of the graphic display device of this design, one in drawing shows a controller and 2 shows the body of a graphic display device (the following, body).

The timer 3 to which a controller 1 starts a count according to a power source ON, The alarm signal generating section 4 which generates an alarm signal (alarm signal) in response to the setup-time progress signal which a timer 3 generates when the counted value of a timer 3 turns into a value corresponding to the time amount set up beforehand, The video-signal controller 5 which takes out and outputs a video signal out of the image read from the image feeder (it is the electric wave of television broadcasting, or is the videocassette recorder which reproduces image record media, such as a video tape) which is not illustrated, Out of said image, it has the sound signal controller 6 which takes out and outputs a sound signal, and changes.

[0009]

A video signal is inputted into a body 2 from the video-signal controller 5, an alarm signal is inputted into it as the graphic display section 7 which carries out expansion projection and displays an image on an observer's eyeball, and the loudspeaker 8 which a sound signal is inputted from the sound signal controller 6, and transmits voice to an observer's lug from the alarm signal generating section 4, and it is equipped with the alarm display section 9 which makes a predetermined warning emblem, a warning message, etc. an image, and carries out an alarm display, and changes. In this example, although the above-mentioned alarm display displays [ lighting-] or displays [ flashing-] in the location (for example, periphery of a visual field) which does not carry out trouble to observation of the image displayed on the graphic display section of a visual field when an observer carries a graphic display device as shown in drawing 2, it may be superimposed and displayed on the image

which should be observed.

In addition, as a dotted line shows, an alarm signal is outputted to drawing 1 from the alarm signal generating section 4 also at the sound signal controller 6, and you may make it superimpose the sound signal showing a warning message on the sound signal of the image itself.

[0010]

Drawing 3 - drawing 5 are drawings showing the example of a configuration of the alarm display section 9, respectively. Drawing 3 has formed the warning lamp (LED) 13 near the eyepiece optical-system 11R of the optical path which leads an image to an observer's eyeballs 12L and 12R through the eyepiece optical system 11L and 11R from the graphic display components (LCD) 10L and 10R. Drawing 4 has formed the warning lamp (LED) 18 near LCD14 of the optical path which leads the image from LCD14 to an observer's eyeball 17 through a beam splitter 15 and the concave surface mirror 16. Drawing 5 has formed the warning lamp (LED) 24 near the beam splitter 20 of the optical path which leads an image to an observer's eyeball 23 through a beam splitter 20, the eyepiece optical system 21, and the concave surface mirror 22 from LCD19.

[0011]

According to the configuration of above-mentioned drawing 3 and drawing 4, since it is not necessary to perform focus doubling to the alarm display itself, it can arrange near optical system or the graphic display component. By that cause Since an alarm display is visible to the periphery of an observer's visual field vacantly in drawing 3, the light from the warning lamp 18 is reflected by the beam splitter 15 at drawing 4 and a part of visual field, or whole brightness and a whole color change in case a warning lamp lights up or blinks, an alarm display can be recognized. Moreover, according to the configuration of drawing 5, as shown in drawing 6, the image of an alarm display can be superimposed and displayed on the image of the graphic display section. In that case, since it is easy to double a focus with an alarm display, a warning message can be displayed in written form like drawing 6, and cautions can be demanded from an observer.

[0012]

Since an alarm display with an image is made when the time amount which this 1st example made the time of the power source [ controller / 1 ] ON criteria time of day, and was beforehand set up from that point in time passes, forgetting the passage of time and being devoted to observation is avoided, and it can prevent too much fatigue. Furthermore, even if it is the case where it dozes equipped with a graphic display device in a configuration of having added the alarm display with the above-mentioned voice, since a warning message with voice is made, if it continues being with a posture [ having equipped with the graphic display device for a long time ], the fault which senses a pain for a neck, a lug, the regio occipitalis capitis, etc. will not arise.

[0013]

Drawing 7 is the block diagram showing the configuration of the 2nd example of the graphic display

device of this design, attaches the same sign to the same part as the 1st example of drawing 1, and omits explanation.

The difference with the 1st example of this 2nd example is having changed so that it might constitute so that a video signal's may be inputted into a timer 3 as an image start signal from the video-signal controller 5, and a timer's 3 might start a count from that time by making the time of the input of a video signal being started into criteria time of day. This modification takes into consideration that the observer has not necessarily carried the body 2, even if an observer is in the condition which turned ON the power source of a controller 1.

[0014]

The setup-time progress signal which a timer 3 generates when it becomes a value corresponding to the time amount which the operation effectiveness of the 1st example of the above is acquired upwards, and counted value set up beforehand this 2nd example Since it corresponds with the elapsed time of since an observer actually carries a graphic display device and begins to observe an image The case where the graphic display device is being kept not equipped after turning ON the power source of a controller 1, Since it removed after equipping with a graphic display device, and image observation was interrupted, when actual wearing time amount becomes shorter than the counted value of a timer 3, the effectiveness of performing an alarm display to the timing based on actual wearing time amount correctly is acquired.

[0015]

Drawing 8 is the block diagram showing the configuration of the 3rd example of the graphic display device of this design, attaches the same sign to the same part as the 1st example of drawing 1, and omits explanation.

The differences with the 1st example of this 3rd example are having formed the wearing sensor 30 which emits a wearing signal in the body 2, when an observer's head or regions of face was equipped with the body 2 of a graphic display device, and having formed the wearing condition decision section 31 which outputs a count start signal to a timer 3 based on the wearing signal inputted from the wearing sensor 30.

[0016]

Drawing 9 (a) and (b) are drawings showing the example of a configuration of the wearing sensor 30, respectively. When it equips with the body 2 of a graphic display device, a touch sensor 40 is formed in the part in contact with an observer's frame, and a touch switch 40 performs ON/OFF actuation by the light pressure received from contact and the frame of a frame and a touch sensor 40, and he is trying to output a wearing signal in drawing 9 (a). Moreover, when the switch 41 which consists of a spring member near [ where an observer's temporal region contacts ] the part is formed when it equips with the body 2 of a graphic display device, and a graphic display device is changed into a predetermined wearing condition, a switch 41 is pushed in and he is trying to turn on in drawing 9

(b).

[0017]

When the existence of an input of the wearing signal from the wearing sensor 30 is supervised continuously and there is an input of a wearing signal, by judging that the observer has carried the graphic display device and outputting a count start signal to a timer 3, this wearing condition decision section 31 increments the counted value of a timer 3, and, thereby, the elapsed time from that point in time counts it by making the time of wearing into criteria time of day. On the other hand, if the input of the wearing signal from the wearing sensor 30 is lost, the input of the count start signal from the wearing condition decision section 31 to a timer 3 will also be severed, and the counted value of the time is cleared in a timer 3. Therefore, the timer 3 will supervise the continuation wearing time amount which the observer has actually equipped with the body 2, and when the continuation wearing time amount reaches the setup time, an alarm display is emitted henceforth.

[0018]

In addition, in the above-mentioned configuration, since the counted value of a timer 3 is cleared, having removed the body 2 temporarily may be unable to grasp continuation wearing time amount correctly, either. When the wearing signal inputted into the wearing condition decision section 31 is temporarily turned off as the cure, you may constitute so that ON condition of a fixed time amount (for example, for 10 minutes) timer 3 may be held.

[0019]

Drawing 10 is the block diagram showing the configuration of the 4th example of the graphic display device of this design, attaches the same sign to the same part as the 1st example of drawing 1, and omits explanation.

This 4th example receives the elapsed time signal from a timer 3, and the current time signal from a clock 50 by time of day and elapsed time display 9a through the alarm signal generating section 51, and he is trying to display current time on an elapsed time list.

That is, when it becomes a value corresponding to the time amount which through [ of the alarm signal generating section 51 ] was carried out until it became a value corresponding to the time amount to which elapsed time set beforehand the elapsed time signal [ from a timer 3 and a clock 50 ], and current time signal, and it was sent to display 9a, was displayed as it is, and was set up beforehand, it is sent to time of day and elapsed time display 9a as a current time flashing signal and elapsed time flashing signal, and it is indicated by flashing.

[0020]

When the current time and elapsed time which were displayed on time of day and elapsed time display 9a become the obstacle of an image at this time, it may display, while erasing the display of this current time and elapsed time and becoming the setup time until the setup time comes, and the

alarm signal generating section 51 may be constituted so that it may be made to blink. Moreover, the timer of the 1st - the 3rd example may be replaced with the clock which has a time-of-day setting up function, and the above-mentioned alarm display etc. may be controlled by setting up specific time of day beforehand.

[0021]

Furthermore, the setup time after equipping with the setup time and the body 2 of a graphic display device after starting image observation until it emits warning combining the configuration of the 2nd example of the above and the 3rd example until it emits warning can also be constituted, respectively so that independent, and any or the alarm display of the direction which reached the setup time previously may be made by enabling it to set it as arbitration. In this case, it becomes possible to set up the operating condition of an alarm display according to an individual according to an observer.

[0022]

[Effect of the Device]

As explained above, in case a graphic display device displays an image on an observer's eyeball from the graphic display section according to the configuration of claim 1 of this design An elapsed time measurement means measures the elapsed time from the criteria time of day about graphic display. An alarm signal is generated based on the elapsed time which the alarm signal generating means measured with said elapsed time measurement means. Since an alarm display means performs an alarm display based on the alarm signal generated by said alarm signal generating means, if an observer does continuation use of the graphic display device [ long duration ] When the elapsed time from said criteria time of day goes through predetermined time, an alarm display will be made, and generating of fatigue, such as an observer's eyeball and an optic nerve fiber, is prevented.

[0023]

Moreover, according to the configuration of claim 2 of this design, since another alarm display is made by the alarm signal generated at the time of day beforehand set up with the alarm signal generating time-of-day setting means in addition to the above-mentioned alarm display, it becomes the alarm display system of a duplex and the fatigue generating prevention effectiveness becomes still larger.

## TECHNICAL FIELD

---

[Industrial Application]

This design starts the graphic display system which used the face wearing mold graphic display device (FMD is called below Face Mounted Display;), and is related with the graphic display system which can switch observation of an electronic image and observation of an external world image especially.

## PRIOR ART

---

### [Description of the Prior Art]

Conventionally, the see-through mold FMD which can perform not only observation of an electronic image but observation of an external world image is known (for example, refer to JP,2-281891,A and JP,4-26289,A).

### [0003]

The example of a configuration of the optical system of the see-through mold FMD is shown in drawing 9. In drawing 9, incidence is carried out to the concave surface half mirror 16 which has arranged the display light from the electronic image of the 2-dimensional graphic display component 11 arranged out of a visual field to the method of impinging through lenses 14 and 15. Thereby, widening of the reflex of the electronic image is carried out by the concave surface half mirror 16, and it is led to an eye. Moreover, the liquid crystal shutter 10 is arranged ahead of the concave surface half mirror 16. Therefore, if the liquid crystal shutter 10 is changed into a protection-from-light condition, an electronic image is observable, and if it changes into a transparency condition, an external world image is observable. In addition, which type may be used although there are POJITAIPU which will be in a protection-from-light condition at the time of electrical-potential-difference impression, and NEGATAIPU which will be in a transparency condition at the time of electrical-potential-difference impression as a liquid crystal shutter 10.

### [0004]

drawing 10 -- see-through one -- it is drawing showing the example of the appearance of the whole FMD, and the see-through carbon button 2 for switching the transparency condition and protection-from-light condition of the liquid crystal shutter 10 to a left lateral is formed in the position of the FMD body 1, and drawing.

### [0005]

And such a see-through mold FMD is used in passenger means, such as an aircraft, for a user's amusement, and is beginning to be used also in an educational field etc.

## EFFECT OF THE INVENTION

---

### [Effect of the Device]

According to this design, all FMD(s) are made see-through ON if needed, and all observers can be made to be able to observe an external world image, or can be made to observe a specific electronic image so that clearly from the above explanation.

## TECHNICAL PROBLEM

---

### [Problem(s) to be Solved by the Device]

However, in the graphic display system using the conventional see-through mold FMD, since only the observer performed control of whether a liquid crystal shutter is changed into a transparency condition, or to change into a protection-from-light condition, there were the following problems.

[0007]

For example, since considering the case where the graphic display system using the see-through mold FMD is used for a passenger transport it is necessary to tell the purport from which it will take off from now on at the time of a takeoff to the observer who is observing the electronic image, to display compulsorily the electronic image of "since it takes off, please fasten a seat belt", for example is desired. The same is said of the time of landing. Moreover, when the situation of requiring emergency occurs, in order to make it cope with it suitable for the emergency concerned to the observer who is observing the electronic image, it will be necessary to make an external world image observe.

[0008]

Moreover, considering the case where the graphic display system using the see-through mold FMD is used for an educational place, it is necessary to make all participants observe a blackboard etc. and to change compulsorily the liquid crystal shutter of the see-through mold FMD into a transparency condition in such a case. Furthermore, since a certain problem is given to all participants, it is necessary to make the electronic image in question observe compulsorily to all the members in such a case.

[0009]

thus, when applying the graphic display system using the see-through mold FMD to a public place, or in using it by two or more persons Although those who have the superintendent's etc. authority will need to make all observers observe an external world image compulsorily or will need to make the predetermined electronic image observe compulsorily Since only the observer did selection of whether a liquid crystal shutter is changed into a transparency condition in the conventional see-through mold FMD, or to change into a protection-from-light condition, the above requests cannot be met.

[0010]

This design solves the above-mentioned technical problem, and in the graphic display system using the see-through mold FMD, a predetermined electronic image is made to observe compulsorily, or it aims at offering the graphic display system by which third persons other than the observer who is using the see-through mold FMD can make an external world image observe compulsorily to an observer to an observer.

MEANS

---

[Means for Solving the Problem]

In order to attain the above-mentioned purpose, the graphic display system of this design The graphic display device equipped with the optical system which projects the image displayed on the graphic display component which displays an image, and said graphic display component at least on an observer's eyeball, The image switch means which switches the image which it is prepared in said graphic display device and one, or another object, and is led to said observer's eyeball, The first image switch means control unit with which the first signal which is formed in said graphic display device and one, or another object, and controls said image switch means was made as an output is possible, With said graphic display device, it is characterized by the ability to be prepared in another object, to have the second image switch means control unit made as an output of the second signal which controls said image switch means is possible, and not to be based on said first signal, but control said image switch means by said second signal compulsorily.

[0012]

Here, said image switch means may be an external world image switch means which switches induction/cutoff of the external world image led to said observer's eyeball like according to claim 2, and may be an image switch means which switches the image according to claim 3 displayed on said graphic display component like.

## OPERATION

---

[Function]

Although the first image switch means control unit may be formed in the position of a graphic display device, and it prepares in another object with a graphic display device and \*\*\*\*\* is also good, if this 1st image switch means control unit is operated, an image switch means will be controlled, and the image observed by this switches. Here, an image names generically these not only including an electronic image but an external world image. Therefore, by operating this first image switch means control unit, an observer can also observe an external world image and can also observe a desired electronic image.

[0014]

Furthermore, the graphic display system of this design is equipped with the second image switch means control unit.

The graphic display device is formed by another object and this second image switch means control unit can control an image switch means compulsorily. Therefore, an external world image can be made to observe compulsorily to an observer, and a predetermined electronic image can be made to observe by operating this second image switch means control unit.

## EXAMPLE

---

[Example]

Hereafter, an example is explained, referring to a drawing. In addition, in the following examples, it is called see-through ON to make the liquid crystal shutter of the see-through mold FMD into a transparency condition, and it is called see-through OFF to make a liquid crystal shutter into a protection-from-light condition.

[0016]

Drawing 1 is drawing showing the configuration of the 1st example of the graphic display system concerning this design.

This example is drawing showing the example of a configuration which enabled it to control whether the liquid crystal shutter of see-through ON / off control 1 (FMD is only called hereafter), i.e., a see-through mold FMD body, is changed into a transparency condition, or it changes into a protection-from-light condition by the image supply unit 20.

[0017]

In drawing 1 , FMD1 is connected with the image supply unit 20 by the cable 21, and a video signal, a power source, a see-through control signal, etc. are supplied from the image supply unit 20 to FMD1. In addition, 22 shows a connector. Moreover, although only one see-through mold FMD1 is connected to the image supply unit 20 in drawing 1 , naturally more than one may be carried out.

[0018]

The see-through carbon button 2 is arranged at FMD1, if an observer operates this see-through carbon button 2 as usual and makes it see-through OFF, the electronic image supplied from the image supply unit 20 is observable, and if it is made see-through ON, an external world image is observable.

[0019]

Although not illustrated, if it has the switch which can be set up and makes it see-through ON whether FMD1 is considered as see-through ON at the image supply unit 20, or it considers as see-through OFF with the switch concerned, a see-through control signal will be supplied to FMD1. And when the see-through control signal from the image supply unit 20 shows see-through OFF, and an observer operates the see-through carbon button 2 to the FMD1 side, control of see-through ON / OFF is possible, but when the see-through control signal from the image supply unit 20 shows see-through ON, FMD1 is compulsorily made with see-through ON, and is made as [ make / even if it operates the see-through carbon button 2 / it / see-through OFF ].

[0020]

Therefore, the operator who operates the image supply unit 20 can make all FMD(s)1 see-through ON, and can make all observers observe an external world image by this by operating the switch concerned.

[0021]

Moreover, also when a power source is not supplied from the image supply unit 20, it is made as

[ serve as / FMD1 / see-through ON ].

[0022]

Here, as shown, for example in drawing 2 A, in see-through OFF, in the signal of a low level, and see-through ON, it can also consider as the clock signal of a predetermined frequency, and although the gestalt of a see-through control signal is arbitrary, as shown in drawing 2 B, in see-through OFF, in the signal of a low level, and see-through ON, it can also consider as a high-level signal.

[0023]

Such see-through ON/OFF control can be performed by forming a liquid crystal shutter control unit as shown in the see-through mold FMD1 at drawing 3 as what controls the transparency condition / protection-from-light condition of a liquid crystal shutter. In drawing 3 the see-through control signal detecting circuit 23 Predetermined level when the see-through control signal from the image supply unit 20 is detected and it is see-through ON, For example, other predetermined level when a high-level signal is outputted and it is see-through OFF, For example, a low level is outputted, when a see-through control signal is what is shown in drawing 2 A, it can constitute from a circuit which detects the frequency of a clock signal, and when a see-through control signal is what is shown in drawing 2 B, it can constitute from a level detector etc.

[0024]

Although the output of this see-through control signal detecting circuit 23 is inputted into the liquid crystal shutter control circuit 24, the signal from the supply voltage supplied to the liquid crystal shutter control circuit 24 from the image supply unit 20 and the see-through carbon button 2 is inputted. And the liquid crystal shutter control circuit 24 detects supply voltage, and when supply voltage is a normal value and the output of the see-through control signal detecting circuit 23 is a low level, and the signal from the see-through carbon button 2 was confirmed, a predetermined electrical potential difference is impressed to a liquid crystal shutter when made with see-through ON with the see-through carbon button 2 and it is made with see-through OFF, it impresses other predetermined electrical potential differences. For example, when the thing of POJITAIPU shall be now used as a liquid crystal shutter, in see-through ON, the liquid crystal shutter control circuit 24 is. 0V are impressed and, in see-through OFF, it is. The predetermined electrical potential difference which is not 0V is impressed.

[0025]

Moreover, when supply voltage is a normal value, and the output of the see-through control signal detecting circuit 23 is high-level, the liquid crystal shutter control circuit 24 disregards the signal from the see-through carbon button 2, and impresses the electrical potential difference made into a transparency condition to a liquid crystal shutter.

[0026]

Furthermore, when the level of supply voltage is detected and supply voltage is not supplied, the

liquid crystal shutter control circuit 24 disregards the signal from the output and the see-through carbon button 2 of the see-through control signal detecting circuit 23, and impresses the electrical potential difference made into a transparency condition to a liquid crystal shutter.

By the above configuration, FMD1 can be compulsorily considered as see-through ON from the outside by operating the image supply unit 20.

[0027]

Next, the 2nd example is explained.

Although drawing 4 is drawing showing the configuration of the 2nd example of this design and the image supply unit 25 supplies a video signal, a see-through control signal, etc., these signals are transmitted by wireless from an antenna 26. In the FMD1 side, an antenna 27 receives the signal by which wireless transmission was carried out.

[0028]

As shown in drawing 5 A and B here, he is trying for a see-through control signal to change see-through ON and see-through OFF in the level of the predetermined level period of the vertical-retrace-line period of a video signal, although wireless transmission of the signal as shown in drawing 2 A and B may naturally be carried out on a predetermined frequency. In addition, in drawing 5, H shows a Horizontal Synchronizing signal and CB shows a color burst signal.

[0029]

Therefore, FMD1 can be compulsorily considered as see-through ON from the outside, and an observer can be made to observe an external world image by operating the image supply unit 25 by forming a liquid crystal shutter control unit as shown in drawing 6 in FMD1.

[0030]

The predetermined level period of the vertical-retrace-line period of the video signal which received the see-through control signal detecting circuit 27 in drawing 6 is sampled, the level is detected, what shows see-through ON, and the thing which shows see-through OFF is judged, in being see-through ON, it outputs predetermined level, for example, a high-level signal, and in being see-through OFF, it outputs other predetermined level, for example, a low level.

[0031]

Although the output of this see-through control signal detecting circuit 27 is inputted into the liquid crystal shutter control circuit 28, the signal from the see-through carbon button 2 is inputted into the liquid crystal shutter control circuit 28. And when the output of the see-through control signal detecting circuit 27 is a low level, the liquid crystal shutter control circuit 28 confirms the signal from the see-through carbon button 2, when made with see-through ON with the see-through carbon button 2, it impresses the electrical potential difference made into a transparency condition to a liquid crystal shutter, and when made with see-through OFF, it impresses the electrical potential difference made into a protection-from-light condition.

[0032]

Moreover, when the output of the see-through control signal detecting circuit 27 is high-level, the liquid crystal shutter control circuit 28 disregards the signal from the see-through carbon button 2, and impresses the electrical potential difference made into a transparency condition to a liquid crystal shutter.

[0033]

Next, the 3rd example of this design is explained.

Drawing 7 is drawing showing the configuration of the 3rd example of this design, it has FMD1, the 1st control device 30, and the 2nd control device 29, and FMD1 and the 1st control device 30 are connected by the cable 33, and the 1st control device 30 and the 2nd control device 29 are connected by the cable 34.

[0034]

The 1st control device 30 is not arranged to the observer who uses FMD1, and although not illustrated to the see-through carbon button 31 and drawing 7, it is equipped with the channel switch means for switching the program of a volume control means and an electronic image etc.

[0035]

Therefore, an observer considers FMD1 as see-through OFF with the see-through carbon button 31, can operate the 1st control unit 30, can observe a desired electronic image, and can hear the voice of the electronic image concerned with desired sound volume by the earphone 32. Moreover, an external world image is observable by considering as see-through ON with the see-through carbon button 31.

[0036]

The 2nd control unit 29 controls the 1st control unit 30, and is operated by predetermined operators other than an observer while it supplies various video signals, a see-through control signal, etc.

[0037]

And the switch for transmitting the see-through control signal for controlling see-through ON/OFF of FMD1 to the 2nd control unit 29, although not illustrated to drawing 7. And the switch for supplying a predetermined electronic image to FMD1 compulsorily (It is hereafter called the 1st switch) It has (it is hereafter called the 2nd switch), and if the see-through control signal which the 1st switch of the 2nd control device 29 is operated, and shows see-through ON is transmitted, the see-through carbon button 31 of the 1st control device 30 will be made with an invalid, and FMD1 will be compulsorily made with see-through ON. When shown in the 1st control unit 30 at drawing 3, the see-through control signal at this time should just prepare the same liquid crystal shutter control circuit, so that it may be drawing 2 A or drawing 2 B.

[0038]

Moreover, if the 2nd switch of the 2nd control device 29 is operated, while a predetermined video

signal will be supplied to a specific channel, a predetermined control signal is transmitted. The 1st control device 30 sets sound volume as predetermined magnitude while switching it to the specific channel concerned, if this control signal is detected. A predetermined electronic image can be made to observe with predetermined sound volume by this to all observers that are using FMD1. In order to perform such control, since such a circuit is common knowledge, detailed explanation is omitted that what is necessary is just to have the switch circuit which performs a channel switch to the 1st control device 30 based on the output of the detecting circuit and detecting circuit which detect the control signal concerned.

[0039]

In addition, when FMD1 is made by see-through ON, the electronic image concerned cannot be made to observe, although a predetermined electronic image can be made to observe compulsorily according to the above-mentioned configuration when FMD1 is made at see-through OFF. Then, the predetermined control signal transmitted when the 2nd switch is operated may be detected, and the control unit which makes FMD1 see-through OFF compulsorily based on it may be formed in the 1st control unit 30. When such a control unit is shown in drawing 3, it is in \*\* that it can constitute similarly at this contractor.

[0040]

Next, the 4th example of this design is explained.

It has FMD1, the 1st control unit 36, the 2nd control unit 35, and switch equipment 37, and it switches with FMD1, and drawing 8 is drawing showing the configuration of the 4th example of this design, and switch equipment 37, and the 1st control unit 36 and the 2nd control unit 35 are connected [ equipment 37 is connected by the cable 40 and ] by cables 38 and 39, respectively.

[0041]

The 1st control unit 36 supplies various video signals, and the 2nd control unit 35 supplies control signals including a specific video signal and a specific see-through control signal etc. Moreover, it is for choosing whether switch equipment 37 is supplied from the 1st control unit 36 to FMD1, or it supplies from the 2nd control unit 35, and is operated by predetermined operators other than an observer.

[0042]

Switch equipment 37 is usually made as [ choose / the 1st control unit 36 ]. Therefore, by considering FMD1 as see-through OFF with the see-through carbon button 2, an observer can observe an electronic image and can hear the voice of the electronic image concerned by the earphone 32. Moreover, an external world image is observable by considering as see-through ON with the see-through carbon button 2.

[0043]

An operator chooses the 2nd control unit 35 as all observers with switch equipment 37 to observe a

specific electronic image compulsorily while supplying the specific video signal concerned from the 2nd control unit 35. The electronic image by the video signal supplied from the 2nd control unit 35 is displayed on FMD1 by this. In addition, at this time, with having described the 3rd example of the above, similarly, a predetermined control signal may be supplied with a specific video signal, and FMD1 may be compulsorily made see-through OFF.

[0044]

Moreover, the 2nd control unit 35 is made as it is possible to send out a see-through control signal. Therefore, an operator chooses the 2nd control unit 35 with switch equipment 37 while sending out a see-through control signal from the 2nd control unit 35. Since all FMD(s)1 are compulsorily made with see-through ON by this, all observers can be made to observe an external world image by it.

[0045]

As mentioned above, although the example of this design was explained, this design is not limited to the above-mentioned example, and it is in \*\* for various deformation to be possible at this contractor.

---

## DESCRIPTION OF DRAWINGS

---

[Brief Description of the Drawings]

[Drawing 1] It is drawing showing the configuration of the 1st example of this design.

[Drawing 2] It is drawing showing the example of the gestalt of the see-through control signal used in the 1st example.

[Drawing 3] It is drawing showing the example of a configuration of a liquid crystal shutter control unit prepared in FMD.

[Drawing 4] It is drawing showing the configuration of the 2nd example of this design.

[Drawing 5] It is drawing showing the example of the gestalt of the see-through control signal used in the 2nd example.

[Drawing 6] It is drawing showing the example of a configuration of the liquid crystal shutter control unit used in the 2nd example.

[Drawing 7] It is drawing showing the configuration of the 3rd example of this design.

[Drawing 8] It is drawing showing the configuration of the 4th example of this design.

[Drawing 9] It is drawing showing the example of a configuration of the optical system of the see-through mold FMD.

[Drawing 10] It is drawing showing the example of the appearance of the see-through whole FMD.

[Description of Notations]

1 -- See-through mold FMD body

2 31 -- See-through carbon button

10 -- Liquid crystal shutter  
11 -- Graphic display component  
14 15 -- Lens  
16 -- Concave surface half mirror  
20 25 -- Image supply unit  
21, 33, 34, 38, 39, 40 -- Cable  
22 -- Connector  
23 27 -- See-through control signal detecting circuit  
24 28 -- Liquid crystal shutter control circuit  
26 27 -- Antenna  
29 35 -- The 2nd control unit  
30 36 -- The 1st control unit  
32 -- Earphone  
37 -- Switch equipment

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- BLACK BORDERS**
- IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- FADED TEXT OR DRAWING**
- BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- SKEWED/SLANTED IMAGES**
- COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- GRAY SCALE DOCUMENTS**
- LINES OR MARKS ON ORIGINAL DOCUMENT**
- REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**